



US007158878B2

(12) **United States Patent**
Rasmussen et al.

(10) **Patent No.:** **US 7,158,878 B2**
(45) **Date of Patent:** **Jan. 2, 2007**

(54) **DIGITAL MAPPING SYSTEM**

(75) Inventors: **Jens Eilstrup Rasmussen**, San Francisco, CA (US); **Lars Eilstrup Rasmussen**, Fairlight (AU); **Bret Steven Taylor**, Mountain View, CA (US); **James Christopher Norris**, Mountain View, CA (US); **Stephen Ma**, Kingsford (AU); **Andrew Robert Kirmse**, Emerald Hills, CA (US); **Noel Phillip Gordon**, Hunters Hill (AU); **Seth Michael Laforge**, Seattle, WA (US)

5,760,783 A 6/1998 Migdal et al.
5,802,492 A * 9/1998 DeLorme et al. 455/456.5
6,054,990 A 4/2000 Tran
6,100,897 A 8/2000 Mayer et al.
6,111,583 A 8/2000 Yaron et al.
6,144,338 A 11/2000 Davies
6,202,026 B1 3/2001 Nimura et al.
6,247,019 B1 6/2001 Davies
6,262,741 B1 7/2001 Davies

(Continued)

OTHER PUBLICATIONS

(73) Assignee: **Google Inc.**, Mountain View, CA (US)

Cosman, M., "Global Terrain Texture: Lowering the Cost," Proceedings of the 1994 Image VII Conference, Tempe, Arizona: The Image Society, pp. 53-64.

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 93 days.

(Continued)

Primary Examiner—Richard M. Camby
(74) *Attorney, Agent, or Firm*—Fenwick & West LLP

(21) Appl. No.: **11/051,534**

(57) **ABSTRACT**

(22) Filed: **Feb. 5, 2005**

(65) **Prior Publication Data**

US 2005/0270311 A1 Dec. 8, 2005

Related U.S. Application Data

(60) Provisional application No. 60/567,946, filed on May 3, 2004, provisional application No. 60/555,501, filed on Mar. 23, 2004.

Various methods, systems, and apparatus for implementing aspects of a digital mapping system are disclosed. One such method includes sending a location request from a client-side computing device to a map tile server, receiving a set of map tiles in response to the location request, assembling said received map tiles into a tile grid, aligning the tile grid relative to a clipping shape, and displaying the result as a map image. One apparatus according to aspects of the present invention includes means for sending a location request from a client-side computing device to a map tile server, means for receiving a set of map tiles in response to the location request, means for assembling said received map tiles into a tile grid, means for aligning the tile grid relative to a clipping shape, and means for displaying the result as a map image. Such an apparatus may further include direction control or zoom control objects as interactive overlays on the displayed map image, and may also include route or location overlays on the map image.

(51) **Int. Cl.**
G01C 21/30 (2006.01)

(52) **U.S. Cl.** **701/208**; 340/995.14

(58) **Field of Classification Search** **701/200–213**;
340/995.1–995

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,559,707 A * 9/1996 DeLorme et al. 701/200
5,613,051 A 3/1997 Iodice et al.

74 Claims, 30 Drawing Sheets

